

PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 03 FEB 2005

WIPO PCT

Applicant's or agent's file reference 15786 MdCm		FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/GB2004/002590	International filing date (day/month/year) 17.06.2004	Priority date (day/month/year) 25.06.2003	
International Patent Classification (IPC) or national classification and IPC G01N27/82, G01N27/83			
Applicant AEA TECHNOLOGY PLC et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 1 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 02.12.2004		Date of completion of this report 31.01.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Joyce, D Telephone No. +31 70 340-3093 	

**INTERNATIONAL PRELIMINARY REPORT
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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language^{*}, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements**^{*} of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-11 as originally filed

Claims, Numbers

1-4 received on 27.12.2004 with letter of 21.12.2004

Drawings, Sheets

1/1 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

^{*} If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-4
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-4
Industrial applicability (IA)	Yes: Claims	1-4
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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Re Item V.

The following documents are referred to in this communication:

D1: WO 02/06812 A (BERGAMINI ANDREA E ; EIDGENOESSISCHE
MATERIALPRUEFU (CH)) 24 January 2002 (2002-01-24)

D2 : WO 03/034054 A (BUTTLE DAVID JOHN ; ACCENTUS PLC (GB)) 24 April 2003
(2003-04-24)

Article 33 PCT:

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

Document D1 discloses (the references in parenthesis applying to this document):

- A method for monitoring a flexible elongate structure comprising at least one layer of steel wires near the surface, the steel wires extending at least partly along the length of the structure (cf., D1 Fig:2 and Page 5 §[0012] lines 1-6)
- the method comprising inducing an alternating magnetic field much less than saturation and monitoring the alternating magnetic flux density near the surface of the structure (cf., D1 Abstract)
- determining from the flux density a corresponding parameter indicative of stress in the steel wires (D1 Page 5 § [0010] lines 6-10), detecting a variation of the measured stress around the circumference, and hence detecting if any wires have broken (D1 Page 7 § [0012] lines 12-17).

From which the subject-matter of claim 1 differs from D1 in that:

the magnetic field is induced using an array of electromagnetic probes around the circumference of the structure, each probe incorporating an electromagnetic coil to induce the said alternating magnetic field.

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The current independent claim cannot be considered as involving an inventive step in the sense of Article 33(3) PCT because document D2 clearly teaches the use of an array of probes incorporating an electromagnetic coil at differing orientations that are successively moved to that location and subsequently provide an indication of stress in the steel wires (cf., D2 Page 3 line 35-Page 4 line 11).

Hence the presently worded sole independent method claim 1 lacks an inventive step in the sense of Article 33(3) PCT.

3 DEPENDENT CLAIMS 2-6

Dependent claims 2-6 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

All additional features of the dependent claims are disclosed by the combination of D1 and D2.

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Claims

1. A method for monitoring a flexible elongate structure comprising at least one layer of steel wires near the surface, the steel wires extending at least partly along the length of the structure, the method comprising inducing an alternating magnetic field much less than saturation in the steel wires using an array of electromagnetic probes around the circumference of the structure, each probe incorporating an electromagnetic coil to induce the said alternating magnetic field and means for monitoring the alternating magnetic flux density near the surface of the structure, determining from the flux density detected by each probe a corresponding parameter indicative of stress in the steel wires, detecting a variation of the measured stress around the circumference, and hence detecting if any wires have broken.
2. A method as claimed in claim 1 wherein the magnetic field is in a direction at a non-zero angle to the longitudinal axis of the wires.
3. A method as claimed in claim 1 or claim 2 wherein the method comprises resolving signals from each magnetic monitoring means into an in-phase component and a quadrature component, and deducing from the in-phase and quadrature components a stress-dependent parameter that is independent of lift-off.
4. An apparatus for monitoring a flexible elongate structure by a method as claimed in any one of the preceding claims.